Historical Vegetation of Seasonally Moist Depressions in the South Fork of the Palouse River Watershed

Bertie J. Weddell, Ph.D.
Draba Consulting
1415 NW State Street
Pullman, WA 99163-3418 USA
email: weddellb@pullman.com

Introduction

This study is part of a larger study of past wetlands in the watershed of the South Fork of the Palouse River. This watershed lies within the region known as the Palouse Prairie in western Latah County, Idaho, and eastern Whitman County, Washington. Rolling hills created by deposition of wind-blown loess characterize the landscape. The soils of the hills are typically deep and well drained. In the nineteenth century, perennial caespitose grasses, often associated with forbs and low shrubs, dominated uplands, but parts of the landscape where surface water accumulated in winter and spring developed distinctive vegetation. Dense stands of common camas (*Camassia quamash*), an important food plant for the region's native people, were the most obvious feature of this association. Aggregations of camas also covered much of the Camas Prairie of eastern Nez Perce, western Lewis, and northwestern Idaho Counties. On this fairly level plateau above the Clearwater River, the soils are loessal in origin, but they tend to be shallower and less well drained than those of the Palouse Prairie (Barker et al. 1983; Lichthardt and Moseley 1997).

During the last 130 years, agricultural drainage, soil erosion, stream downcutting, and invasions of exotic species have eliminated or drastically altered the seasonally moist meadow communities of topographic depressions in the Palouse Prairie. Because of the extensive modification of this landscape and biota, little is known about the species composition of these wetlands prior to Euroamerican settlement. The purpose of this study was to obtain information from historical records on the plant species composition of these communities. It focuses on communities typical of places where flow accumulates on the landscape in deep, well drained or moderately well drained soils. It does not address other types of wetlands that occurred in the Palouse Prairie, such as those associated with ponds, flowing water in channels, or perched water tables.

Methods

In late 1843 and 1844, the German botanist Charles Geyer collected plants in the "Gamass [camas] prairies" of northern Idaho and southeastern Washington (Piper 1906; M^{c}Kelvey 1955; Cox 1999). Descriptions of his travels in this region and his catalogue were published in the London Journal of Botany and Hooker's Journal of Botany

between 1845 and 1847 and in Hooker's Journal of Botany between 1848 and 1853 (Geyer 1845; 1846a,b,c; Hooker 1847a,b; Hooker 1848, 1850, 1852, 1853). These accounts provide a description of the camas-dominated plant communities on the plateaus above the Clearwater and Snake Rivers during the "pre-settlement" period (that is, prior to the arrival of substantial numbers of Euroamerican settlers).

To obtain information on the vegetation characteristic of topographic depressions in our study area, I had to rely on later records. In the early part of the twentieth century, accounts of the vegetation of the Palouse region were published by Piper and Beattie (1901) and by Weaver (1917). Although these works provide information on plants of wet meadow habitats in our study area, they have the disadvantage of being published after substantial settlement, along with changes in land use and the arrival of non-native species, had occurred.

These two types of historical accounts—Geyer's pre-settlement reports from the Camas Prairie, and subsequent, post-settlement reports that included our study area—complement each other. To obtain more specific and detailed information on the vegetation of seasonally moist depressions in the Palouse watershed, I consulted the collections of the Marion Ownbey Herbarium at Washington State University and the Stillinger Herbarium at the University of Idaho. The labels of species or subspecies that Geyer, Weaver, or Piper and Beattie considered important in wetlands associated with low, moist, or wet meadows, as well as species that I or experts that I consulted with considered likely to have occurred in camas meadow communities, were examined. Taxa that were collected in such habitats in our study area prior to 1917 were considered components of the seasonal wet meadow communities of the Palouse watershed.

Nomenclature follows Kartesz (1994). Information on synonyms was also obtained from Hitchcock et al. (1994).

Results

Species that Geyer reported in wet meadows or camas prairies or plains of the Clearwater drainage or southeastern Washington are listed in Table 1, and species that Weaver considered important constituents of wet meadow communities in southeastern Washington are given in Table 2. Geyer and Weaver both noted that camas formed dense and extensive stands. Geyer stated that "a deep blue covers these extensive plains when the *Gamassia* [*Camassia*] is in full bloom" (Geyer 1846b:299-300); similarly, Weaver pointed out that in early spring "large areas in the wet meadows are characterized by the dark blue flowers of *Quamasia* [*Camassia*] *quamash*. . . . The individuals frequently occur as abundantly as 35-45 in a square meter" (Weaver 1917:106). Both authors also reported that western blue flag (*Iris missouriensis*), American bistort (*Polygonum bistortoides*), and species of buttercup (*Ranunculus*) were important components of wet meadow communities. According to Weaver (1917:106), *Ranunculus platyphyllus* [*Ranunculus orthorhynchus* var. *orthorhynchus*] was extremely abundant in wet meadows in early spring, and "its great numbers, combined with its profuse flowering habitat" made it extremely important in the "vernal period."

Sedges were evidently an important component of seasonally moist habitats. Geyer reported finding *Carex aurea* in "springy meadows" (Hooker 1852:377). Weaver identified four sedge taxa as important components of floodplain communities associated

with small streams. Two of these—Nebraska sedge (*Carex nebrascensis*) and inflated sedge (*Carex vesicaria*)—were collected in wetlands characterized by non-flowing water in our study area prior to 1917, and therefore they probably occurred in camas meadows (Table 3). Piper and Beattie (1901:37) reported that "*Carex festiva* var. *pachystachya*" (*Carex festiva*) was "very common in wet meadows."

Taxa that were considered by Weaver, Geyer, or Piper and Beattie to be important in wet meadows or camas meadows and that were also collected in the watershed of the South Fork of the Palouse River in wet or low-lying habitats prior to 1917 are listed in Table 3. It is likely that these plants were common in seasonally moist meadows of topographic depressions in Whitman or Latah Counties prior to 1917. Specimen data indicate that in addition to camas, these wet meadow communities were characterized by several graminoids, such as tufted hairgrass (*Deschampsia cespitosa*), and members of the genera *Alopecurus*, *Agrostis*, and *Beckmannia*. A number of forbs were also collected in depressional wetlands. The lily family (Liliaceae), iris family (Iridaceae), smartweed family (Polygonaceae), parsley family (Apiaceae), and buttercup family (Ranunculaceae) were particularly well represented. Because many early herbarium specimens lack habitat data, some species that probably occurred in seasonally wet meadows in the study area do not appear in Table 3. For example, Weaver, Piper, and Beattie considered California false hellebore (*Veratrum californicum*) a species of wet or moist meadows, but it was not possible to confirm this from specimens, because the labels of false hellebore plants collected in Pullman and Palouse City in the 1890s did not include any information about habitat.

The flora of wet meadow communities included many species that were also associated with either wetter or drier habitats. The plants that occurred in these wetlands shared the ability to tolerate the exigencies of the environment in topographic depressions, which was characterized by alternating periods of wet and dry soil.

The next wettest type of community was the community associated with the floodplains of small streams. Graminoids such as spike-rushes (*Eleocharis* spp.), rushes (*Juncus* spp.), and sedges (*Carex* spp.) were prominent in this type of community (Weaver 1917). According to Weaver, field mint (*Mentha canadensis borealis* [*M. arvensis*]) was "very important ecologically" in spike-rush—sedge communities, because of its "well developed and extensive rhizomes" (Weaver 1917:104).

Environments slightly drier than the seasonally wet meadows of the Palouse were characterized by meadow steppe or "prairie" species. Many forbs of upland meadow steppe also occurred in wet meadows. For example, meadow death-camas (*Zigadenus venenosus*), nine-leaf lomatium (*Lomatium triternatum*), velvet lupine (*Lupinus leucophyllus*), northern bedstraw (*Galium boreale*), cinquefoil (*Potentilla gracilis*), northern mule's ears (*Wyethia amplexicaulis*), prairie gentian (*Gentiana affinis*), and western blue flag (*Iris missouriensis*) all occurred in wet meadows (Table 3) and also were common members of the Idaho fescue/common snowberry (*Festuca idahoensis*/ *Symphoricarpos albus*) association that was typical of Palouse meadow steppe (Daubenmire 1970).

Another plant of both wet meadows and dry sites is broad-fruit mariposa (*Calochortus nitidus*). This species is endemic to the Palouse and Canyon Grasslands of eastern Washington and northern Idaho (Weddell and Lichthardt 1998). It was collected in topographic depressions in Pullman in the 1890s (Table 3), but it has not been

collected recently in Whitman County, and the Washington Natural Heritage Program lists it as threatened (www.wa.gov/dnr/htdocs/fr/nhp/refdesk/lists/plantrnk.html, January 10, 2002).

It is interesting to note that reed canarygrass (*Phalaris arundinacea*), which now forms virtually monolithic stands in stream channels and floodplains throughout the Palouse Prairie, was not collected in the study are prior to 1917 and is not listed by Piper and Beattie as occurring in the Palouse Region prior to 1901. This plant occurred in some parts of the West prior to white settlement, but the highly invasive form that now dominates streams and streamside environments in the Intermountain West may be descended from a non-native cultivar or a hybrid between a cultivar and a native form (Merigliano and Lesica 1998). The earliest Latah or Whitman County specimen in the Stillinger or Ownbey herbaria was collected by R. Daubenmire in 1938 in a "muddy roadside ditch" 5 mi north of Moscow (WSU Ownbey Herbarium Spec. No. 261001).

Discussion

The usefulness of historical records such as herbarium specimens depends on several factors affecting the availability, completeness, and reliability of the documentary record. First, the value of historical documents rests in part on whether the information that was preserved is a representative and adequate sample of past conditions. Specimen collections reflect collectors' biases about what was and was not important. This kind of "cultural filtering" of the past is inherent in documentary records (Swetnam et al. 1999:1192). Second, the usefulness of historical documents depends on their clarity and completeness.

Because of these considerations, my method of reconstructing the composition of historical wetland communities is conservative. Taxa that occurred in those wetlands might not have been collected and preserved as herbarium specimens prior to 1917, or appropriate data might not have been recorded, or specimens might have been destroyed. In this study, early specimen labels often lacked a description of the habitat where a plant was collected, and any habitat information that was included was quite general. Similarly, locations were described only in very general terms, and data on associated species were not given. Finally, a fire in the herbarium at the University of Idaho destroyed many specimens for the period of interest. For these reasons, the data from herbarium specimens provide only a partial list of plants that occurred in wet meadows in our study area prior to 1917. Species that were present in historical wetlands but were not collected or recorded in that habitat will be omitted from this reconstruction.

Nevertheless, the combination of data from specimens and from historical records provides a useful, though sketchy, glimpse of the vegetation of wet meadow communities prior to major impacts from agriculture and drainage. Information from these sources indicates that these communities were dominated by camas, accompanied by forbs from the parsley, buttercup, and smartweed families. In addition, many forbs of characteristic of meadow steppe communities and graminoids characteristic of floodplains probably were common in these seasonally moist topographic depressions.

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Table 1. Species occurring in wet meadows or camas plains or prairies of the Palouse or Camas Prairies according to Geyer. LJB = London Journal of Botany; HJB = Hooker's Journal of Botany.

Family	Genus and species (re: Geyer)	Geyer's catalog cumber	Current nomenclature	Citation	Geyer's habitat description
Apiaceae	*Peucedanum triternatum*	557	*Lomatium triternatum* var. *triternatum*	LJB 6:235.	Grassy prairies of the Nez Perce Indians in large, wet, open, stony places.
Asteraceae	*Calliopsis*	644	*Coreopsis tinctoria* var. *atkinsoniana*	LJB 5:298-301; LJB 6:247.	Wide, flat, fertile, grassy or camas plains or prairies.
Asteraceae	*Senecio canus*	484	*Senecio canus*	LJB 6:252.	Wet stony places, camas prairies of Nez Perce highlands.
Cyperaceae	*Carex aurea*	190	*Carex aurea*	HJB 7:377	Thickets in springy meadows.
Iridaceae	*Iris Missuriensis (Missourensis)*	--	*Iris missouriensis*	LJB 5:301; LJB 5:520.	Small, fertile meadows; moist, often stony plains.
Leguminosae	*Trifolium eriocephalum*	379	*Trifolium eriocephalum*	LJB 6:208.	High, swampy meadows in the Nez Perce Mountains.
Liliaceae	*Amianthium Nuttallii*	374	*Zigadenus* (sp.?)	HJB 7:373.	High plains and camas prairies.
Liliaceae	*Camassia esculenta*	628	*Camassia quamash*	LJB 5:297; HJB 7:375.	Wet spongy meadows; high, fertile plains in wet tracts; "almost the only plant in the wet, undulated portion" of the Coeur d'Alene River.
Liliaceae	*Veratrum viride*	--	*Veratrum viride*	LJB 5:291; LJB 5:297.	Dry, elevated parts of valley meadows; wet, spongy meadows.
Poaceae	*Aira elongata*	342, 490	*Deschampsia elongata*	LJB 5:291; LJB 5:297; LJB 5:298-301; LJB 5:520; HJB 8:17.	Low, moist valley meadows (genus *Aira*); wet, spongy meadows (genus *Aira*); wide, flat, fertile, grassy or camas plains or prairies (genus *Aira*); moist, often stony plains (#342); rocks and stony swamps and sides of rivulets (*Aira elongata* #341 and #490).
Poaceae	*Alopecurus geniculatus*	--	*Alopecurus geniculatus*	LJB 5:301.	On the margin of ponds in the camas plains.
Poaceae	*Panicum capillare*	--	*Panicum capillare*	LJB 5:291.	Low, moist valley meadows.

Family	Genus and species (re: Geyer)	Geyer's catalog number	Current nomenclature	Citation	Geyer's habitat description
Poaceae	*Trichodium scabrum*	--	*Agrostis scabra*	LJB 5:291; LJB 5:301.	Wide, flat, fertile, grassy or camas plains or prairies.
Polygonaceae	*Polygonum Bistorta*	405	*Polygonum bistortoides*	HJB 5:262.	Moist, deep, grassy meadows on high and cold plains of the Nez Perce Indians (near Anatone, Washington [St. John 1956]).
Ranunculaceae	*Myosurus minimus*	322	*Myosurus minimus*	LJB 5:301; LJB 6:67.	On the margin of ponds in the camas plains; borders of pools in the camas prairies.
Ranunculaceae	*Ranunculus Flammula*	306	*Ranunculus flammula*	LJB 5:298-301; LJB 6:66.	Wide, flat, fertile, grassy or camas plains or prairies; high, grassy plains.
Valerianaceae	*Valeriana edulis*	337	*Valeriana edulis*	LJB 6:239.	Wet meadows, high plains.

Table 2. Taxa occurring prior to 1917 in wet meadows and floodplains of small streams in southeastern Washington and adjacent Idaho according to Weaver (1917). Species that Weaver considered major constituents of wet meadow communities are in bold type. Underlined taxa were also reported by Piper and Beattie (1901) in moist, wet, or low meadows of the Palouse region.

Family	Taxon (re: Weaver)	Current term
Wet meadows		
Apiaceae	*Cicuta occidentalis*	*Cicuta douglasii*
Apiaceae	*Cogswellia triternata*	*Lomatium triternatum*
Apiaceae	***Heracleum lanatum***	***Heracleum maximum***
Asteraceae	*Senecio serra*	*Senecio serra*
Asteraceae	***Wyethia amplexicaulis***	***Wyethia amplexicaulis***
Clusiaceae	*Hypericum scouleri*	*Hypericum scouleri*
Cyperaceae	*Carex aperta*	*Carex aperta*
Equisetaceae	*Equisetum* spp.	*Equisetum* spp.
Fabaceae	*Lupinus leucophyllus*	*Lupinus leucophyllus*
Fabaceae	*Trifolium douglasii*	*Trifolium douglasii*
Iridaceae	***Iris missouriensis***	***Iris missouriensis***
Lamiaceae	*Mentha canadensis borealis*	*Mentha arvensis*
Lamiaceae	*Prunella vulgaris* var. *lanceolata*	*Prunella vulgaris* ssp. *lanceolata*
Liliaceae	*Calochortus nitidus*	*Calochortus nitidus*
Liliaceae	***Hookera hyacinthina***	***Triteleia hyacinthina*** var. ***hyacinthine***
Liliaceae	***Quamasia quamash***	***Camassia quamash***
Liliaceae	***Veratrum californicum***	***Veratrum californicum***
Liliaceae	*Zygadenus venenosus*	*Zigadenus venenosus*
Malvaceae	*Sidalcea oregana*	*Sidalcea oregano*
Onagraceae	*Epilobium adenocaulon*	*Epilobium ciliatum* var. *ciliatum*
Poaceae	***Deschampsia caespitosa***	***Deschampsia cespitosa***
Poaceae	*Hordeum nodosum*	*Hordeum brachyantherum*
Poaceae	*Poa annua*	*Poa annua*
Poaceae	*Poa triflora*	*Poa palustris*
Polygonaceae	***Polygonum bistortoides***	***Polygonum bistortoides***
Polygonaceae	*Polygonum emersum*	*Polygonum amphibium* var. *emersum*
Polygonaceae	*Polygonum polygaloides*	*Polygonum polygaloides*
Polygonaceae	*Rumex mexicanus*	*Rumex salicifolius* var. *mexicanus*

Family	Taxon (re: Weaver)	Current term
Polygonaceae	*Rumex occidentalis*	*Rumex aquaticus* var. *fenestratus*
Primulaceae	*Steironema ciliatum*	*Lysimachia ciliata*
Ranunculaceae	*Delphinium simplex*	*Delphinium burkei*
Ranunculaceae	***Ranunculus platyphyllus***	***Ranunculus orthorhynchus*** var. ***orthorhynchus***
Rosaceae	*Potentilla rectiformis*	*Potentilla gracilis*
Rubiaceae	*Galium boreale*	*Galium boreale*
Scrophulariaceae	*Castilleja miniata*	*Castilleja miniata*
Scrophulariaceae	*Orthocarpus tenuifolius*	*Orthocarpus tenuifolius*
Floodplains of small streams		
Brassicacaeae	*Radicula curvisiliqua*	*Rorippa curvisiliqua* var. *curvisiliqua*
Cyperaceae	*Carex lanuginosa*	*Carex lanuginosa*
Cyperaceae	*Carex monile* var. *pacifica*	*Carex vesicaria* var. *pacifica*
Cyperaceae	*Carex nebraskensis*	*Carex nebrascensis*
Cyperaceae	*Carex pachystachya*	*Carex pachystachya*
Cyperaceae	*Carex utriculata*	*Carex utriculata*
Cyperaceae	*Eleocharis acicularis*	*Eleocharis acicularis*
Cyperaceae	*Eleocharis acicularis* var. *bella*	*Eleocharis bella*
Cyperaceae	*Eleocharis palustris*	*Eleocharis palustris*
Juncaceae	*Juncus balticus*	*Juncus balticus*
Juncaceae	*Juncus bufonius*	*Juncus bufonius*
Juncaceae	*Juncus ensifolius*	*Juncus ensifolius*
Juncaceae	*Juncus suksdorfii*	*Juncus nevadensis* var. *nevadensis*
Juncaceae	*Juncus tenuis*	*Juncus tenuis*
Lamiaceae	*Mentha canadensis borealis*	*Mentha arvensis*
Onagraceae	*Epilobium adenocaulon*	*Epilobium ciliatum* var. *ciliatum*
Poaceae	*Alopecurus californicus*	*Alopecurus (*sp.?)
Poaceae	*Beckmannia erucaeformis*	*Beckmannia syzigachne*

Table 3. Taxa likely to have been common in seasonally moist meadows of topographic depressions in Whitman or Latah Counties prior to 1917. The taxa listed were considered by Weaver, Geyer, or Piper and Beattie to be important in moist, wet, or low meadows, topographic depressions, or floodplains or were collected in those habitats in Whitman Co, WA or Latah Co, ID prior to 1917. O = Ownbey Herbarium; S = Stillinger Herbarium.

				Specimens			
Family	**Genus and species**	**Common name**	**Reference**	**Collector and herbarium**	**Year**	**Habitat**	**Location**
Apiaceae	*Heracleum maximum*	cow-parsnip	Weaver	Hunt & Kimmel (O)	1906	near creek bottom	Pullman
Apiaceae	*Lomatium triternatum*	nine-leaf lomatium	Geyer	Piper (O) Aldrich (S)	1893 1910	low meadows low ground	Pullman Moscow
Apiaceae	*Perideridia gairdneri*	Gairdner's yampah	Piper and Beattie	Aldrich (S)	1907	low ground	Moscow
Asteraceae	*Senecio serra*	butterweed groundsel	Weaver	Piper (O)	1893	wet ground	Pullman
Asteraceae	*Wyethia amplexicaulis*	northern mule's ears	Weaver	Piper (O)	1893	wet ground	Pullman
Brassicaceae	*Rorippa curvisiliqua*	western yellowcress	Weaver	Hull (O) Pickett (O)	1892 1915	moist places wet soil along streams	Pullman Pullman
Caryophyllaceae	*Cerastium arvense*	field chickweed	Piper and Beattie	Elmer (O)	1897	very rich plots of ground in bottoms	Pullman
Cyperaceae	*Carex nebrascensis*	Nebraska sedge	Weaver	Henderson (O) Hunt (O)	1892 1906	wet meadows wet places near rr.	Union Flat Pullman
Cyperaceae	*Carex vesicaria*	inflated sedge	Weaver	Lake & Hull (O)	1892	edges of ponds	Pullman
Gentianaceae	*Eryngium articulatum*	beefthistle		Pickett (O)	1916	occasional in flats along streams	Pullman
Gentianaceae	*Gentiana affinis*	prairie gentian		Thomas (S)	1916	low meadow	Tomer's Butter
Iridaceae	*Iris missouriensis*	western blue flag	Geyer; Weaver	Pickett (O)	1916	flats	Pullman

			Specimens				
Family	**Genus and species**	**Common name**	**Reference**	**Collector and herbarium**	**Year**	**Habitat**	**Location**
Iridaceae	*Sisyrinchium idahoense*	blue-eyed grass	Piper and Beattie	Piper (O) Elmer (O) Hunter (O)	1894 1897 1899	low meadows deep rich soil of bottomlands bottom land	Pullman Pullman Pullman
Liliaceae	*Allium geyeri*	Geyer's onion	Piper and Beattie	Henderson (O) Thomas (S)	1894 1916	moist ground, meadows, and along creeks low meadows	Moscow to Camas Prairie Moscow
Liliaceae	*Camassia quamash* and *Camassia quamash* ssp. *quamash*	common camas	Geyer; Weaver	Piper (O) Ransom (S) Elmer (O) Elmer (O) Hunter (O) Hunt & Kimmel (O) Pickett (O) Pickett (O) Dunkle (S)	1893 1895 1896 1897 1899 1906 1915 1916 1916	wet meadow moist places moist places swales near streams wet lowland damp ground low flat low, moist flats wet meadows	Pullman Moscow Pullman Pullman Pullman Pullman Pullman Pullman Genesee
Liliaceae	*Calochortus nitidus*	broad-fruit mariposa	Weaver; Piper and Beattie	Lake & Hull (O) Piper (O) Piper (O) Hunter (O) Pickett (O)	1892 1893 1894 1899 1916	low bottoms low meadows low ground bottomland flats	Pullman Pullman Pullman Pullman Pullman
Poaceae	*Agrostis exarata*	spike bentgrass	--	Piper (O) Piper (O)	1893 1894	wet ground low ground	Pullman Pullman
Poaceae	*Agrostis scabra*	winter bentgrass	Geyer	Piper (O)	1894	damp ground	Pullman
Poaceae	*Alopecurus geniculatus*	water foxtail	Geyer	Hunt (O) Hunt (O)	1906 1906	wet muddy bottom low places	Pullman Pullman

			Specimens				
Family	**Genus and species**	**Common name**	**Reference**	**Collector and herbarium**	**Year**	**Habitat**	**Location**
Poaceae	*Beckmannia syzigachne*	American sloughgrass	Geyer	Lake & Hull (O) Piper (O) Hunt (O)	1892 1893 1906	wet ground edges of ponds wet places along railroad	Union Flat Pullman Pullman
Poaceae	*Deschampsia cespitosa*	tufted hairgrass	Weaver	Piper (O)	1893	wet ground	Pullman
Poaceae	*Melica spectabilis*	showy oniongrass	Piper and Beattie	Elmer (O)	1897	small meadows of sloughs	Pullman
Polygonaceae	*Polygonum bistortoides*	American bistort	Geyer	Elmer (O)	1897	very low grassy marshes	near Moscow
Polygonaceae	*Polygonum polygaloides*	white-margined knotweed	Weaver	Piper (O)	1892	moist meadows	Pullman
Primulaceae	*Lysimachia ciliata*	fringed loosestrife		Aldrich (S) Pickett (O)	1907 1916	low, moist ground near a spring in pasture	Moscow Pullman
Ranunculaceae	*Clematis hirsutissima*	Douglas' clematis	Piper and Beattie	Pickett (O)	1915	flats	Pullman
Ranunculaceae	*Ranunculus orthorhynchus* and *R. orthorhynchus* var. *platyphyllus*	straightbeak buttercup	Weaver	Henderson (O) Piper (O) Piper (O) Pickett (O)	1894 1893 1893 1916	moist ground wet places wet ground low, damp ground	near Moscow Pullman Pullman Pullman
Scrophulariaceae	*Castilleja cusickii*	Cusick's paintbrush	Piper and Beattie	Lake & Hull (O) Piper (O) Piper (O) Aldrich (S)	1892 1898 1898 1910	low ground wet meadows wet meadows low ground	Pullman Pullman Collins, ID Moscow
Valerianaceae	*Valeriana edulis*	edible valerian	Geyer	Piper (O) Pickett (O)	1893 1915	low ground low, damp flats	Pullman Pullman